Waste Age

Waste to Wealth

Award-winning landfills provide local and global benefits.

Photo courtesy of U.S. EPA

SELF RELIANCE: The Southeastern Chester County (Pa.) Refuse Authority developed a landfill gas energy project without the aid of a third-party developer and expects to recover its initial project investment in eight years.

By Victoria Ludwig and Joe Fanjoy

At the January 2008 Landfill Methane Outreach Program (LMOP) Conference and Project Expo in Washington, the U.S. Environmental Protection Agency (EPA) formally recognized 19 partners from 12 states for excellence in developing landfill gas energy projects that turned landfills into community assets, cut greenhouse gas emissions and created renewable energy.

"By turning waste into wealth, together we are building a clean and plentiful supply of energy for our country," said Stephen L. Johnson, EPA Administrator and keynote speaker at the conference. The annual gathering brings together solid waste and energy professionals to network and learn about the latest industry projects, technologies and financial incentives. This year's two-day conference included 20 technical presentations, 55 exhibits and a project expo that featured 51 domestic and international landfills that are ripe for development. The conference proceedings and profiles of the expo landfills are available at www.epa.gov/lmop.

Each year, LMOP acknowledges partners who are especially creative in developing landfill gas energy projects. The 2007 award winners, representing both small and large landfills, used a variety of innovative project structures, applied state-of-the-art technology, and found diverse applications for landfill gas. The following case studies demonstrate how landfill gas is a reliable local source of green energy that can deliver benefits directly to communities. Winners also promoted landfill gas energy projects locally and nationally, an important goal of LMOP.

Project of the Year

Greentree Landfill Gas Energy Project: Kersey, Pa.

LMOP partner Beacon Generating used creative financing and applied state-of-the-art gas cleanup technology to develop one of the largest pipeline-quality landfill gas energy projects in the country. The system can process more than 15 million standard cubic feet of raw landfill gas per day from Veolia Environmental Service's (ES) Greentree Landfill in Kersey. Since July 2007, the Greentree plant has been processing more than 9,200 standard cubic feet per minute (scfm) of the more than 10,000 scfm of landfill gas that previously was burned in a flare.

Several innovative gas cleanup technologies from LMOP partners remove nearly all of the moisture, carbon dioxide, oxygen and impurities — resulting in a clean, high-British thermal unit (Btu) fuel. To begin, the landfill owner, Veolia ES, installed patented wellhead boots that prevent oxygen intrusion during collection of landfill gas. Next, Norwalk, Conn.-based EMCOR Energy Services designed and constructed the processing facility, which employs Air Liquide-MEDAL's proprietary mem-

Photo courtesy of U.S. EPA

A LONG-DISTANCE AFFAIR: As part of the Greentree Landfill gas project in Kersey, Pa., project developers installed seven miles of HDPE pipe in just three months.

ABOUT LMOP

LMOP is a voluntary technical assistance and partnership program that helps businesses and communities reduce methane emissions from landfills by encouraging the recovery and use of landfill gas as a renewable energy source. Approximately 435 landfill gas energy projects currently operate in the United States. These projects have multiple benefits, including generating revenue from energy production and offsetting the use of non-renewable resources such as coal, natural gas and oil. Plus, projects prevent methane — a potent contributor to global climate change — from entering the atmosphere.

LMOP also supports international project development through the Methane to Markets Partnership. For example, LMOP has conducted workshops and completed pre-feasibility landfill studies in Brazil, China and India, to name a few. EPA encourages private sector entities, development banks, non-governmental organizations, and financial and technical experts to join the Methane to Markets Project Network to participate in the development of methane capture and use projects internationally. To learn more about international project development resources and opportunities, visit the partnership's Web site at www.methanetomarkets.org

brane technology to remove 98 percent of the carbon dioxide and about half of the remaining oxygen. Finally, project developers used a patented pipe fusion machine to construct seven miles of 12-inch, high-density polyethylene pipeline in just three months.

The Greentree project reflects Veolia's commitment to work closely with the local community to create jobs, contribute to the local tax base and minimize its environmental footprint. The success of the project has led to the exploration of pipeline-quality opportunities at other Veolia ES landfills.

"Our goal has always been to go above and beyond in building a safe environment and sustainable future," says Todd Watermolen, vice president of engineering and environmental compliance with Veolia ES. "It's great to see our efforts be nationally recognized by this important program."

Project of the Year

Iris Glen Landfill Gas Energy Project: Johnson City, Tenn.

Pipeline-quality or high-Btu landfill gas energy projects usually are limited to landfills with large amounts of gas, but not in Johnson City. There, a relatively low flow of 1,500 scfm of landfill gas is processed into a cleaner gas that has proven to be a viable alternative to an electricity or medium-Btu project. As a municipal government, Johnson City was interested in implementing a landfill gas energy project while limiting the impact on taxpayers. The city was able to achieve this by forming a public-private partnership with Newburgh, Ind.-based Energy Systems Group (ESG) that resulted in no up-front costs to the city. The end user of the landfill gas also was able to reduce its expenses by using ESG's state-of-the-art gas cleanup technology, which eliminated the need for expensive burner modifications and made the project financially feasible.

The Mountain Home Energy Center (MHEC) — a combined heat and power plant located on the campus of the James H. Quillen Veterans Administration (VA) Medical Center — burns the high-BTU landfill gas in a boiler and engine as a direct replacement for natural gas. MHEC supplies steam, power and chilled water to the VA hospital, several East Tennessee State University buildings and a large civic center. To ensure that MHEC receives gas that is clean, dry and free of impurities such as siloxanes and volatile organic compounds, the gas is cleaned using Air Liquide-MEDAL's membrane separation system and the SulfaTreat system, which removes hydrogen sulfide.

Before constructing the four-mile pipeline along a city right-of-way that passes through dense residential development, Johnson City launched a public awareness campaign, including sponsoring meetings, publishing newspaper articles, and distributing door hangers, to keep residents informed of the project developments. In addition, Johnson City and Waste Management operate an educational center at the landfill; storyboards show visitors how landfill gas is generated, collected and processed for steam and power generation.

As a result of this project, Johnson City receives a steady stream of revenue from the sale of landfill gas. The VA pays ESG a stable price for landfill gas, and ESG expects to recover its investment during the 25-year life of the project. In fact, the project was so successful that ESG is considering applying the same technology to similar landfills.

Project of the Year

Southeastern Chester County Refuse Authority (SECCRA) Landfill Gas Energy Project: Chester County, Pa.

In Chester County, another small landfill (250 scfm) proved viable for a landfill gas energy project. SECCRA,

a public entity, developed this project on its own, without the assistance of a third-party developer. Five years of planning led to economic benefits that exceeded expectations. The project generates nearly 1 megawatt (MW) of green power, which is sold to PJM Interconnection, a regional transmission organization based in Norristown, Pa., that coordinates the movement of wholesale electricity. With gross income expected to be $500,000 in 2007, SECCRA anticipates recovering its initial investment of $3.2 million in eight years.

SECCRA empowered its staff to hire a team of outside experts, learn about the interconnection to the utility and construct the project. The team of experts included LMOP partners American Environmental Group, Caterpillar, Concord Engineering Group, DCO Energy and Roman Consulting. DCO Energy served as design engineer, and Roman Consulting acted as project manager.

"By turning the gas into useful electricity, we are offsetting the use of fossil fuels and creating value that didn't exist before," says Rick Cairns, chairman of SECCRA's board of directors. "On all fronts, this is a win-win project."

The staff found creative ways to generate additional revenue and promote green power. For example, to realize the best rate for electricity sales, SECCRA Power became a member of PJM Interconnection. Participation in the PJM real-time wholesale market enables SECCRA to sell electricity at the market rate rather than at a low fixed rate. Revenue has averaged $35,000 each month. In addition, sales of renewable energy credits has generated $83,000.

Energy Partners of the Year

Alameda Power & Telecom and the City of Palo Alto: Watsonville, Calif.

When the city of Palo Alto, Calif., committed to increase the percentage of its electricity load from renewable energy in 2002, it looked in its own backyard for resources. Tapping renewable energy from local landfills would help Palo Alto meet the city's own clean energy goals. To create demand for this green power, the city developed the PaloAltoGreen program, and customers signed up in record numbers.

To meet the community's demand for green power and its 2002 pledge to obtain 10 percent of its power from newly acquired renewable energy sources by 2008 — 20 percent by 2015 — Palo Alto teamed with Alameda Power & Telecom to pursue landfill gas opportunities. Since 1999, Palo Alto and Alameda had been working with LMOP and LMOP partner Ameresco to buy or generate renewable energy from landfills. LMOP provided the city with information on landfills in northern California and their potential for project development. Eventually, the two community-based power generators agreed to buy landfill gas energy from the Buena Vista Landfill, which generates 3.2 MW of green power and is owned by Santa Cruz County.

"By securing long-term contracts for landfill gas, we can continue to serve our customers reliably and responsibly through our ongoing commitment to clean energy," says Girish Balachandran, assistant director of resource management at City of Palo Alto Utilities.

The Buena Vista project is one of three that will help Palo Alto exceed its renewable energy goals and add to Alameda Power & Telecom's impressive portfolio of 80 percent renewables. Contracts with two other community landfills mean that Palo Alto and Alameda will be sharing a total of 18.6 MW of renewable energy in 2008 — enough to power nearly 1,200 homes for a year.

"Beneficial use of landfill methane derived from our community's waste stream has been one of our highest resource conservation priorities," says Patrick Matthews, manager of Santa Cruz's recycling and solid waste services. "The Santa Cruz County Department of Public Works has been working many years to develop this renewable energy resource."

Industry Partner of the Year

Ameresco: Framingham, Mass.

LMOP partner Ameresco continues to display its leadership by consistently developing innovative and flexible landfill gas energy projects. EPA selected Ameresco as Industry Partner of the Year — Ameresco's third LMOP award in five years. Three new projects in 2007, including a small, creative 800-kilowatt (kW) project, demonstrate Ameresco's ability to provide long-term environmental and economic solutions to landfills and the communities they serve.

In Northampton, Mass., Ameresco leveraged its experience and local resources to develop an economically viable project from a relatively low flow (400 scfm) of landfill gas. The company secured financing and owns and operates the 800 kW project that provides enough power to supply the equivalent of 500 homes annually. The city of Northampton will benefit from the use of landfill gas for years to come through reduced odor and cleaner air. Plus, the electricity helps meet the area's appetite for green power.

"Ameresco is proud to work with such great partners and to be a part of these exciting projects that have a positive, material impact to the environment and the surrounding communities," says Mike Bakas, vice president of renewable energy at Ameresco.

Ameresco's 11 operational electric projects generate nearly 36 MW of renewable energy, while its two operational direct-use projects consume nearly 4,000 scfm of landfill gas. The combined annual energy savings is equivalent to powering nearly 23,000 homes and heating nearly 13,000 homes each year. Plus, the combined annual greenhouse gas reductions are equal to planting nearly 150,000 acres of forest, removing the emissions of 105,000 vehicles, or preventing the use of nearly 1.3 million barrels of oil.

Community Partner of the Year

Greater Lebanon Refuse Authority (GLRA) and PPL Energy Landfill Gas Energy Project: Lebanon, Pa.

GLRA and PPL Energy created and built a renewable energy education facility for local, national and international visitors. With the goal of "empowering our future leaders with green energy," the project demonstrates the power of renewable energy from landfill gas, wind and solar energy, all at one site. Located at the GLRA landfill in Lebanon, Pa., the facility already has hosted more than 2,000 students, teachers and community groups.

With energy prices rising every day, GLRA and PPL Energy are demonstrat-

HOW DOES LMOP HELP DEVELOP LANDFILL GAS ENERGY PROJECTS?

To encourage the use of landfill gas, LMOP provides software tools, marketing assistance, access to technical experts and tailored technical services to facilitate development of landfill gas energy projects. For these award-winning projects, LMOP provided various types of technical assistance, including identifying candidate landfills and end users, meeting with partners and conducting site visits, identifying funding or incentives, and promoting projects through ribbon-cuttings events or poster sessions. LMOP has provided technical assistance to 330 of the 349 projects that have started since LMOP's inception in 1994.

With hundreds of landfills still untapped, LMOP would like to assist in identifying other project opportunities. Specifically, LMOP works to:

· Assess landfills that are viable candidates for project development.

· Estimate energy potential from landfills and match the supply to end-user demands.

· Conduct preliminary feasibility studies for landfill gas energy projects.

· Provide technical expertise in the use of landfill gas in boilers and other thermal applications.

· Promote the environmental and economic benefits of landfill gas energy projects.

For more information about LMOP, visit the program's Web site at www.epa.gov/lmop or contact Victoria Ludwig, Program Manager, at (202) 343-9291 or ludwig.victoria@epa.gov.

ing to the community that valuable renewable energy alternatives are available locally. The renewable energy project encompasses a 3,200-kW landfill gas energy project, a 2,000-watt wind turbine, and a 1,000-watt solar array — enough to power more than 2,000 homes for a year. From the classroom, students can view the landfill gas engines and monitor, in real time, how various renewable energy resources generate green electricity for the power grid.

"The Greater Lebanon Refuse Authority is dedicated to conserving natural resources," says Michael Pavelek, executive director of GLRA. "Not only will this facility generate electricity from a renewable fuel, but we will also work to raise awareness in the community about the benefits of alternative energy." The project continues GLRA and PPL's long-standing commitment to energy and environmental education. Also, the landfill's innovative water treatment and operating practices already have gained national recognition and serve as field laboratories for three local universities.

Endorser of the Year

CIFAL-Atlanta

CIFAL-Atlanta has successfully promoted landfill gas energy projects on a global scale. CIFAL-Atlanta co-hosted its second workshop with LMOP in Davis, Calif., in September 2007. The Greening Solid Waste Practices workshop brought together local government officials and solid waste experts from around the world to share best practices in solid waste management. A key goal of the forum was to assist participating local governments in achieving the U.N. Millennium Development Declaration on environmental sustainability through the implementation of landfill gas energy projects.

"We are proud to partner with LMOP to host training workshops," says Jennifer Wilson, program director of environmental sustainability at CIFAL-Atlanta. "CIFAL-Atlanta has found methane capture and reuse to be the single most effective means by which governments can decrease greenhouse gas emissions, utilize a local energy source, and secure additional revenue."

Approximately 100 senior-level policymakers, elected officials and solid waste professionals from the public and private sector explored sustainable solid waste management policy, public-private partnerships, project development, greenhouse gas reductions and alternative solid waste management practices. Ten attendees represented countries outside the United States.

The workshop was hosted by Yolo County, Calif. For years, the county's landfill has been a leader in the research and development of alternative solid waste management practices, including producing energy from landfill gas. Participants toured the facility, which is engaged in energy production and leachate recirculation, and hosts an anaerobic digester.

As always, LMOP is proud to honor this year's award winners, which demonstrate creativity, persistence and leadership, and also enjoy economic and environmental benefits. The pool of winners shows that landfill gas is a viable energy option for a wide cross-section of the country — government agencies, private industry, utilities, hospitals, non-profit organizations and ordinary citizens.

In addition, this year's awards highlight that with more and more communities demanding green power and reduced environmental impact, landfills of all sizes are turning into valuable assets.

Victoria Ludwig is a program manager for the EPA Landfill Methane Outreach Program. Joe Fanjoy is a technical writer for Eastern Research Group. WA